



LOWERING YOUR FACILITY'S CARBON EMISSIONS.

How burner system efficiencies can help meet government regulations and ESG goals.

NO ONE KEEPS YOU RUNNING LIKE BDC.



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OVERVIEW

CARBON EMISSIONS FACT:

Manufacturing and production industries produce one-fifth of the global carbon emissions with estimates indicating that emissions from manufacturing are projected to increase by 17% between 2024 and 2050. In addition, these same industries account for 54% of the world's energy usage.

CHANGE IS IN THE AIR

The Intergovernmental Panel on Climate Change (IPCC) has called for the world to reduce global greenhouse gas (GHG) emissions to net zero by 2050 in an effort to avoid the worst effects of climate change.

It's a major reason why carbon emissions are impacting the need for positive change in the inefficient processes used in the production of steel, cement, chemicals, and extraction and refining of oil, gas, and coal. This has become critical for sustaining our planet and has led to government regulations that are becoming more stringent.

THE CHALLENGE

Emission reductions from these industries can be the most complex to decarbonize because of things such as market, infrastructure barriers, and government regulatory initiatives.

A prime example of the compliance challenges for facilities is in the state of Colorado. The state's Air Quality Control Commission has put in place the Greenhouse Gas Emissions and Energy Management for Manufacturing Phase 2 standards, also known as GEMM 2.

What GEMM 2 ensures is that the state's most polluting facilities will reduce greenhouse gases. It's a regulatory effort that, by 2030, will reduce greenhouse gas emissions from industrial sources by up to 20%. A driving factor for meeting GEMM 2 compliance ranges from stringent enforcement procedures to monetary penalties for failure to comply.

IPCC has called for the world to reduce GHG emissions to net zero by 2050.



GEMM 2 ensures that Colorado's most polluting facilities will reduce greenhouse gas emissions from industrial sources by up to 20% by 2030.

With all these factors in place even facilities that utilize natural gas are now realizing that fuel inefficiencies must be addressed sooner than later to lower carbon emissions. This wasn't always the case due to the consistent reduction in the cost of natural gas that, in 2005 was \$24/therm, and now in 2024 is \$1.55/therm. This has resulted in excessive fuel waste throughout U.S. manufacturing and increased carbon production at a higher rate than overall national production. Dramatically reducing carbon production can be achieved by simply addressing inefficiencies.

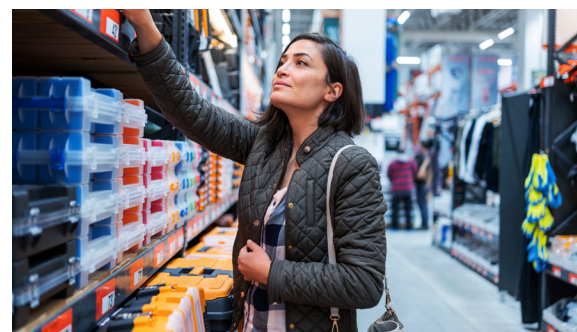
DEMANDS TO LOWER CARBON EMISSIONS GOES WELL BEYOND GOVERNMENT COMPLIANCE.

While meeting regulatory demands to lower the rate of carbon emissions is quickly becoming the number one priority for companies in North America and worldwide, there's another factor. Many leading brands are now seeing that they have to align with eco-conscious consumers who are using their buying power to drive sustainable efforts and curb global warming.

This green consumer base is also causing a sustainability shift in retail giants such as Walmart as they have set in place a goal to reduce absolute global scopes 1 & 2 GHG emissions 35% by 2025 and 65% by 2030 and are looking to their product suppliers to do the same. In addition, other retailers such as Home Depot and Amazon are also looking to achieve net zero emissions objectives throughout their product supply chain.

From energy producers to product manufacturers and retailers, the governance committees of these companies are also demanding lower carbon emissions. It's essential to staying competitive and for meeting ESG strategies and impact reports – all of which must reflect measurable changes that consumers, government regulations and even stockholders are demanding.

Dramatically reducing carbon production can be achieved by simply addressing inefficiencies.



Eco-conscious consumers are causing a sustainability shift in retail giants such as Walmart to reduce GHG emissions, who in turn are looking to their product suppliers to do the same.

The following pages detail how incorporating new efficiencies in the operation of your burner systems can lower the overall carbon emissions of your facility. It will give you insights into potential burner problems you might be facing and the solutions BDC can engineer to resolve these challenges.



LOWERING CARBON EMISSIONS. THE HOW:

BDC CARBON EMISSIONS SOLUTION 1:

IMPROVED HEAT TRANSFER

Reducing carbon emissions in the energy and manufacturing sector is what BDC delivers through burner efficiency solutions. Fuel efficiency, temperature controls, temperature uniformity – our goal is your goal: reduce energy usage and lower carbon emissions.

FACILITY CHALLENGE:

Burner system fuel efficiency is not consistent and is causing excessive energy consumption and carbon emissions.

BDC SOLUTION:

Improved fuel/air ratio control on the burners to improve fuel transfer efficiencies.

- When a burner is set-up too “rich” it can result in unburned fuel exhausting through the system and being wasted
- If a burner is setup too “lean” the result can be excess fuel usage to heat the extra air that is present
- Having proper fuel/air ratio throughout the entire firing range is often overlooked and is very inefficient
- In all cases, *reducing extra fuel usage = lowering your carbon production*

“The manufacturing industry is one of the largest producers of carbon emissions due to the industry’s energy-intensive processes which account for 24% of direct carbon emissions.”

ENVIRONMENTAL PROTECTION AGENCY (EPA)



BDC CARBON EMISSIONS SOLUTION 2:

OPTIMIZE TEMPERATURE CONTROLS

Between government regulation and a company's net zero goals, achieving energy efficiency and reducing carbon emissions within a facility environment is essential. At BDC, we engineer smart energy solutions that provide optimal regulation of a burner's heating system through precise temperature controls. This makes a massive impact on fuel efficiency. Now, instead of constantly activating or deactivating the system, temperatures stay within specified range to eliminate unnecessary and inefficient fluctuations.

FACILITY CHALLENGE:

Inability to regulate burner temperatures.

BDC SOLUTION:

Optimize temperature controls to reduce hysteresis that causes excess fuel usage.

- When a burner constantly overshoots and then undershoots a temperature setpoint, more fuel is used than needed
- Switching from mechanical linkages to direct-coupled actuators will significantly improve temperature accuracy
- Properly programming PID loops in the temperature controller (or PLC) will reduce the burner system from "searching" for the setpoint
- In all cases, *reducing extra fuel usage = lowering your carbon production*

"Industrials are not only facing pressure from record-high energy prices, but may also be under time pressure to decarbonize their footprint if they want to future-proof themselves by meeting the not-too-distant net-zero goals that have been set for many industrial sectors."

MCKINSEY & COMPANY RESEARCH FIRM



BDC CARBON EMISSIONS SOLUTION 3:

CONVERSION TO NATURAL GAS

In the last four years the U.S. Department of State reports over \$240 billion has been allocated for clean energy manufacturing investments. This is part of an effort to reduce greenhouse gas emissions 50-52% by 2030. One solution BDC can provide is converting your systems to burn natural gas. This results in fewer emissions of nearly all types of air pollutants and carbon dioxide (CO₂) emissions than burning coal or petroleum products to produce an equal amount of energy. In fact, according to the Center for Climate and Energy Solutions, natural gas emits almost 50% less CO₂ than coal.

“Almost 23% of all U.S. greenhouse gas emissions come directly from industrial sources such as manufacturing, food processing, mining, and construction.”

CENTER FOR CLIMATE & ENERGY SOLUTIONS

FACILITY CHALLENGE:

Reducing carbon emissions to meet government regulations or meet ESG (environmental, social, and governance) goals.

BDC SOLUTION:

Converting carbon-heavy fuels, such as coal, heavy oils and other solid fuels, to natural gas.

- BDC has successfully engineered many coal to natural gas burner retrofits
- Natural gas improves the operation of almost all applications by having greater turndown, smaller burner footprints, and less sooting – all resulting in increased heat transfer efficiencies
- In all cases, *reducing extra fuel usage = lowering your carbon production*



BDC CARBON EMISSIONS SOLUTION 4:

UNIFORM TEMPERATURES

What is often called “decarbonization” is a net-zero challenge that can seem filled with obstacles for organizations reliant on energy usage. What seems impossible can be made possible through what McKinsey describes as “defensive strategies through retrofitting high-emissions assets to lower their emissions.”

“Energy related emissions [from fuel sources such as oil and coal] accounts for 83% of CO2 emitted access energy and land-use systems.”

MCKINSEY & COMPANY RESEARCH FIRM

FACILITY CHALLENGE:

Burner temperatures are not uniform.

BDC SOLUTION:

Engineering on/off firing or pulse firing to improve temperature uniformity and reduce fuel consumption for multi-burner furnaces or ovens.

- Hot and cold spots in an oven or furnace can lead to extended heating times and excess fuel usage
- Proper placement of thermocouples can create a much more accurate representation of the oven or furnace uniformity
- Increasing the burner's flame velocity increases the air mixing in the furnace to improve temperature uniformity
- In all cases, *reducing extra fuel usage = lowering your carbon production*



BDC CARBON EMISSIONS SOLUTION 5:

HYBRID HEATING

There are a variety of reasons why it's often impossible for a facility to completely switch to a new energy source for their burner systems. This is why a combination of different heat sources through hybrid heating is a viable solution that BDC can provide. It has the advantages of shortening "heat up" times, plus can be turned on and off as required for utilizing just gas, just with electric or both. Not only can this lead to energy usage cost savings, but it can lead to lower energy usage that also lowers your carbon footprint.

FACILITY CHALLENGE:

Challenges to effectively incorporate electric heating without sacrificing operating costs or performance.

BDC SOLUTION:

Engineer a hybrid electric/gas-fired burner system to create fast come-up times while maintaining even temperatures with electric.

- Running a furnace or oven solely on electric energy is not feasible, but a combination of electric and natural gas is possible
- Natural gas would be used when the energy demand is high, such as when the furnace or oven is first being brought up to temperature
- Electric heat is used to maintain operating temperature, allowing the gas burners to idle or turn off
- During peak electricity rate hours, gas would be utilized
- These efforts would reduce carbon emissions and support your green initiatives of incorporating electric heating
- In all cases, *reducing extra fuel usage = lowering your carbon production*

"Forward-looking companies are designing decarbonization plans by assessing levers and other carbon management technologies to gain energy and process efficiency."

WORLD ECONOMIC FORUM



BDC CARBON EMISSIONS SOLUTION 6:

FURNACE INSULATION AND DUCTING

Burner systems that utilize inefficient thermal management solutions such as insulation and ducting can experience excessive operational costs as well as significant energy waste and carbon emissions. This falls under Scope 1 and 2 emissions and both are literally “hot spots” that facilities turn to BDC to better control. Factors such as temperature requirements, chemical resistance, and mechanical strength all need to be factored in when selecting the appropriate solution for your burner application.

FACILITY CHALLENGE:

Burners have excessive heat loss.

BDC SOLUTION:

Insulating furnaces and ducting to improve heat transfer efficiencies and reduce heat loss

- BDC can help identify specific areas where heat can be escaping out of your furnace or oven due to poor insulation or leaks
- In all cases, *reducing extra fuel usage = lowering your carbon production*

“It is estimated that between 20 and 50% of industrial energy input is lost as waste heat in the form of hot exhaust gases, cooling water, and heat lost from hot equipment surfaces and heated products.”

ENERGY.GOV





Learn more about how BDC engineers and field techs can deliver new energy efficiencies for your facility to lower fuel consumption and carbon emissions. What you'll discover is why no one keeps your running like BDC.

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